

INTEGRA BIOFIS 5.0, A COLLABORATIVE, PARTICIPATORY AND INTERDISCIPLINARY EXPERIENCE FOR UNDERGRADUATES IN NURSING

N. Rodríguez-Henche, L. Calleros, M. Saura, I.D. Román, L. Muñoz-Moreno,
A.M. Bajo

Universidad de Alcalá (SPAIN)

Abstract

The pandemic has forced us to reinvent ourselves and to consider new strategies in education. Motivation, fundamental to student performance, has been seriously compromised. In this sense, the type of motivation we are interested in "fostering" is intrinsic motivation, closely linked to the concept of learning-centered goals and objectives. The action implemented is committed to the approach to challenge-based learning in the Degree in Nursing (UAH), in order to develop an integrative training with an interdisciplinary focus. Biochemistry and Physiology came together in Integra BioFis 5.0 and through participatory and collaborative techniques we pursued meaningful learning. The general objective of the actions to be developed is the training and motivation of students, in order to achieve a better education taking into account the benefits of challenge-based learning. All the students of the Biochemistry and Physiology subjects (n = 120) took part in the learning experience, organized in 12 teams. The action was carried out online through the virtual platform. An initial session, in which the objectives, methodology, timetable and evaluation criteria were clarified. Topics that aroused the students' interest were randomly assigned (<https://wheeldcide.com>). The assigned tutors guided the students in overcoming the challenges of each stage. The development of the action consisted of a series of phases: i) documentation and literature search; ii) integration of objectives and choice of presentation format; iii) elaboration of the graphical document; and iv) peer review of presentations and voting for the best contribution. The students' papers, as well as the rubrics with comments and suggestions from each of the instructors, were returned to the teams immediately. A final session was held, in which they reflected on the activity they had carried out, highlighting the positive aspects of the training for the development of competences and skills, such as: i) search for information from quality sources; ii) synthesis and integration of contents; iii) work as a team; and iv) elaboration of an original and own work. Voting was then shown for the papers presented, revealing the names of the three teams with the most votes, finalists and winners. The results show that Integra BioFis 5.0 is a constructive experience that introduces the students the use of scientific documents, develops their creativity, promotes teamwork, and helps to assimilate/consolidate the knowledge of Physiology and Biochemistry subjects. And above all, it encourages the intrinsic motivation in students.

Keywords: Motivation, Biochemistry, Physiology, Interdisciplinary, Collaborative, Participative, Undergraduates, Game-based Learning.

1 INTRODUCTION

Motivation is a very important aspect of a student's performance. The main characteristics of motivation include the existence of a goal, personal initiative and affective-emotional charge [1]. The type of motivation we are interested in "fostering" is intrinsic motivation, which is closely linked to the concept of learning-centred goals and objectives. One of the aspects that best captures the interest of learners, and the most neglected ones, is the possibility of offering the practical application of what is learned, favouring experiences that make this possible. Promoting interrelation and involvement with reality is one of the most motivating elements [2,3].

The implementation of challenge-based gamification in education provides numerous advantages, including the following [4]: i) it increases student motivation and self-motivation; ii) it is a system of increasing difficulty; iii) it makes the content more attractive; iv) it favours the acquisition of knowledge; v) it stimulates concentration; vi) it improves performance; vii) it favours teamwork; viii) it encourages the use of new technologies; and ix) it helps to exercise logic and strategy.

In this sense, playful experiences have been used in Higher Education [5-7] in which students are more actively involved in their learning, as opposed to the classical teacher-centred approach. Instructors who

have used this type of strategies highlight their valuable usefulness, as they allow students to acquire and apply the knowledge reviewed in the subject as well as develop many other competences and enhance different skills [8]. This fact, together with the extraordinary situation experienced during the pandemic, has led us to consider the implementation of new innovative and inclusive educational tools.

The specific teaching objectives are:

- To reinforce the group, to integrate, to disinhibit, to encourage.
- To develop divergent and creative thinking.
- To awaken their curiosity.
- To quickly promote student participation, capturing their interest and involving them in the teaching/learning process.
- To favour the learning of diverse knowledge and its collective construction.

2 METHODOLOGY

The proposed action took into account the participation of all students of the subjects Biochemistry and Physiology (n = 120) when planning the activity. The proposed timetable is shown in Fig. 1.

First, a virtual space was created on the Blackboard (Bb) platform in which both disciplines coexisted from the beginning of the course. The 12 participating teams coincided with the groups created to carry out the seminars and practical classes in the different first-year subjects. To this end, a team space was set up in the Bb for them in order to use the collaborative tools: blog, wiki, diary, e-mail, file sharing tool, discussion board and Bb Collaborate.

In the initial face-to-face or virtual session, the objectives, methodology, timetable and evaluation criteria were made clear. In this session, interesting and topical challenges were randomly assigned to the students' interest using the Integra BioFis 5.0 roulette (<https://wheeldecide.com>). The topics were used to review, consolidate and integrate the fundamental concepts of biochemistry and physiology, as well as to acquire essential skills and competences (Table 1). In turn, tutors were assigned to each team to provide specific objectives for each challenge. Each instructor was in charge of providing advice on the tools used and guiding the students throughout the process.

Table 1. Topics included in Integra BioFis 5.0 roulette.

<i>Topics</i>
Obesity: the pandemic of the 21st century
Metabolic adaptation to a prolonged fasting situation
Diabetes mellitus type 1
Contraception
Why is sport beneficial to health?
Pregnancy and breastfeeding: physiological and metabolic adaptations
Usain Bolt's 100 m dash
Heart-healthy lifestyles
Neuroendocrine and metabolic adaptations to stress
High-protein diet: risks and benefits
The "botellón": more than just a night out
Overcoming anxiety in "turbulent times" by regulating the pH of the internal environment

The development of the activity consisted of a series of phases:

- 1 Documentation and literature search (two weeks). The students carried out a literature search to tackle the challenges posed in each discipline, working in two subgroups. Finally, they pooled and presented a single document in the Activities section of the Bb. The rubrics from each of the instructors were returned to the teams with comments on the search for quality information.

- 2 Integration of objectives and choice of presentation format (three weeks). A document with a maximum length of 4 pages was handed in integrating the objectives worked on. Again, it was presented in the Activities section of the Bb. The rubrics of each of the instructors were returned to the teams with comments on the integration of the objectives (formal aspects and contents) of Biochemistry and Physiology.
- 3 Elaboration of a graphic document (podcast, infographic, video or similar) with audio of maximum 10 min (two weeks) that was uploaded to the Bb team forum. The rubrics of each of the instructors were returned to the teams with comments on the presentation (formal aspects and contents) of the assigned topic.
- 4 The graphic documents, once reviewed by the teachers, were uploaded to the Forum tool of the virtual platform for students to view (two weeks). They then voted for the best contribution using a Google form. The rubrics of each of the instructors were returned to the teams with comments on the use of collaborative tools and the progress of the collaborative work.

In the final virtual session, the activity was reflected upon, highlighting the positive aspects of the training carried out for the development of competences and skills: i) search for information from quality sources; ii) synthesis of content; iii) teamwork; iv) preparation of an original work of one's own. Then, the percentages resulting from the voting on the documents presented were shown and the names of the three most voted teams, finalists and winners were revealed.

Subsequently, we moved on to the assessment for learning (taking into account the influence of this on the student's motivation and self-esteem) and the assessment of competences (taking as indicators the progress, content, sources, the preparation of the graphic document, teamwork and responsibility, among other aspects). In both subjects, the maximum mark achieved was 10% of the final mark. Finally, as a reward for participation, a participation diploma was awarded, and for the best Integra BioFis 5.0 graphic document presented, diplomas and prizes were awarded to the members of the winning team. The presentation of diplomas and prizes took place in person.

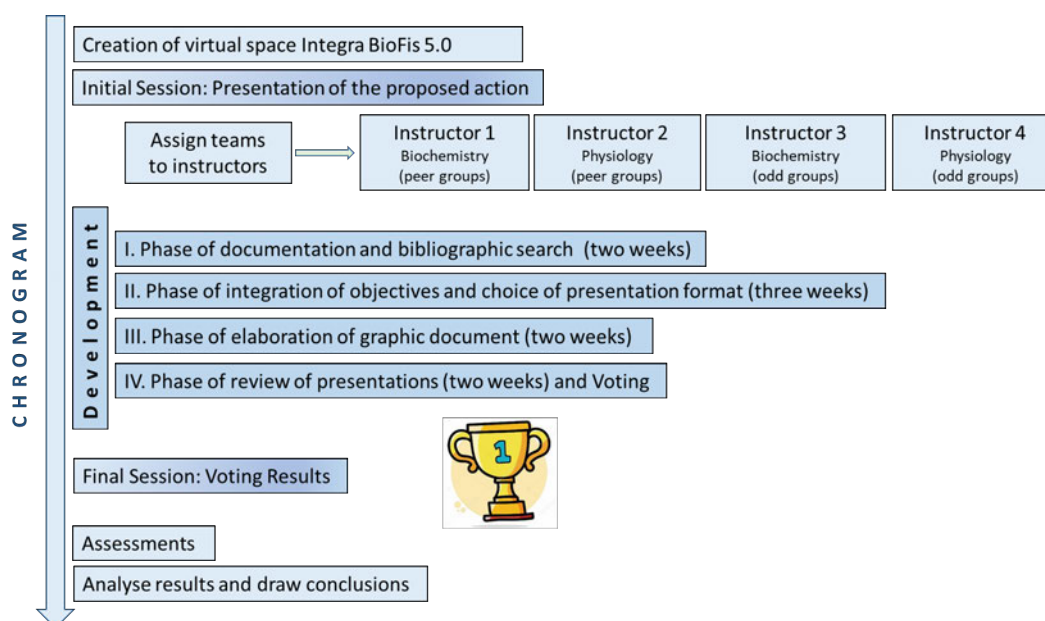


Figure 1. Timeline of the Integra BioFis 5.0 action.

We consider that the strength of this action lies in the fact that the students were guided throughout the process. To this end, the instructors checked at each stage whether the challenges had been met and returned the completed rubrics and the appropriate comments to the teams. In this way, effective feedback was provided immediately and always before moving on to the next phase (Fig. 2).

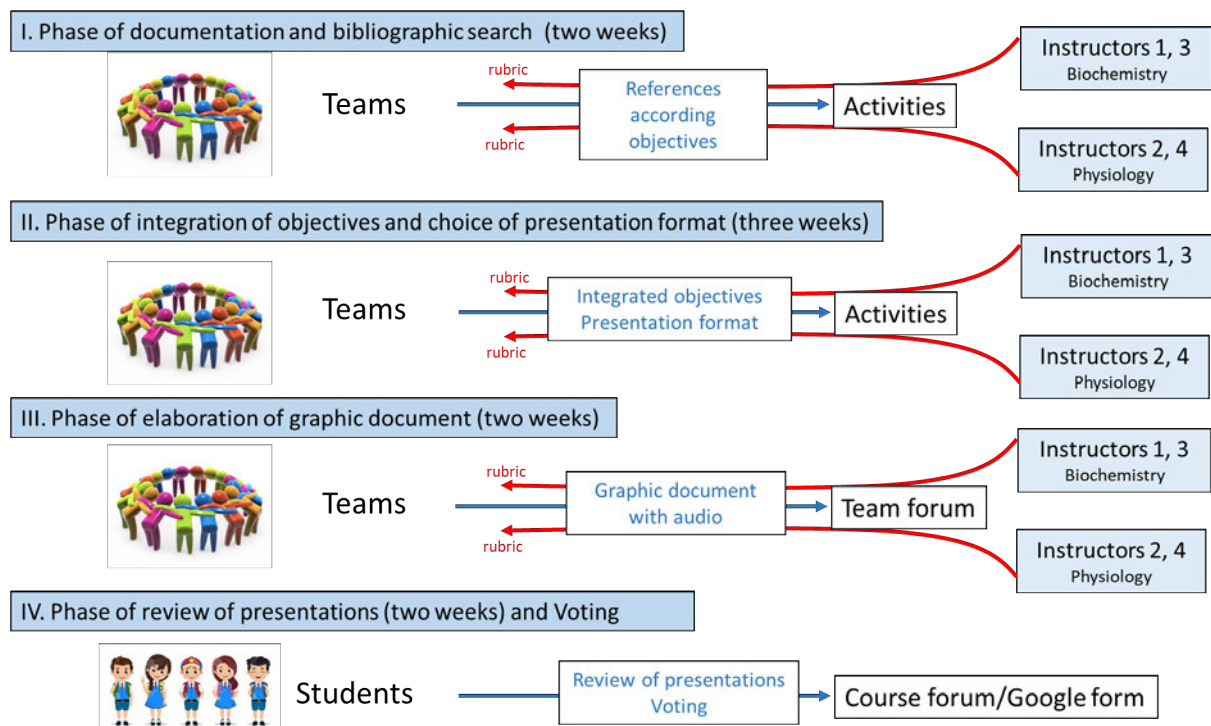


Figure 2. Detailed diagram of the development phases of the Integra BioFis 5.0 action.

3 RESULTS

Once the action was over, the students were asked to make an overall assessment of the action carried out, using a Google form. All the comments on the activity were very positive. In addition, they evaluated, by filling in the sections "The best" and "What could be improved", each phase of the action: i) documentation and bibliographic search, ii) integration of objectives and choice of presentation format, iii) elaboration of graphic document, and iv) review of presentations and voting.

3.1 Phase of documentation and bibliographic search

In the section of the form relating to "The best", it should be noted that they valued positively the use of scientific documents and how to cite them correctly. In addition, they considered that they learnt to discriminate the sources used. In terms of "What could be improved", they indicated that they should have had more time to be able to undertake the objectives of this phase. Some students felt that they should have been guided to a greater extent by the instructors, although others saw this as a difficulty that brought the group together.

This phase provided a training opportunity for student on bibliographic gathering and analysis. Students become aware of the abundance of information, as well as the importance of discriminating its relevance. The instructors, evaluating the students' answers and seeing how this phase was developed, believe that a possible improvement would be to include an explanation to the whole group on how to look for bibliography, how to cite it, etc.

3.2 Phase of integration of objectives and choice of presentation format

In the section "The best" of this phase, what students find most difficult is being able to work as a team. Integration is seen as an "excuse" to be able to assimilate and consolidate the knowledge of both disciplines. In relation to "What could be improved", they emphasized that they should have had more time and it can be deduced that some groups have had difficulties in getting through this phase. In addition, they point out that it is a very good way of reinforcing the contents of the two subjects, because the more relationships you establish in a concept, the easier and faster you learn it.

This phase promoted integration of biochemistry and physiology knowledge to emphasize their relationships, connections, and applications to a variety of real-life situations. Students should be aware how these two disciplines address similar processes in different but complementary ways.

The instructors' reflection on how to improve this phase involves getting closer to the teams, so that those who are not functioning as such know how to manage conflicts. In addition, we should train the teams in the use of tools and strategies to improve communication. It is important to note that some of the team members took on the role of facilitators in managing possible communication problems.

3.3 Phase of elaboration of graphic document

For the students, "the best thing" about this phase was the creativity developed when choosing an original graphic document. This fact generated a greater motivation that had a very positive influence on the learning of the revised contents. As for "What could be improved", most of the comments referred to technical problems related to video and sound editing of the documents presented.

Instructors consider that in order to improve this phase we should insist that they keep to time and urge them to revise the document more thoroughly to minimize errors of sound, quality, etc.

3.4 Phase of review of presentations and voting

In the section "The best" of this phase, they consider that the tools made available to them (blog, wiki, diary, email, file sharing tool, discussion board and Bb Collaborate) through the e-learning platform were adequate, helping them to establish communication with the other members of the group. In relation to "What could be improved", they indicated that they would have needed more knowledge in the use of these tools.

Instructors believe that the process of viewing and voting on the graphic documents should be improved. An individual short assessment containing questions related to the content of presentations could be implemented to identify whether reviewing and understanding of presentations are achieved. In addition, we should teach them how to use the different tools made available to them and how they help us to follow the progress of our students.

4 CONCLUSIONS

From this educational strategy, we conclude that Integra BioFis 5.0 is a constructive experience, taking advantage of all the benefits of implementing the overcoming of challenges in the educational environment. This has had an impact on teaching practice, to the extent that what has been "reflected" and "worked" in Integra BioFis 5.0 has contributed to improving the quality of virtual teaching, "fostering" intrinsic motivation in students.

This interdisciplinary learning action has allowed students to develop awareness of the interconnections between Biochemistry and Physiology, as well as to discover that what they are learning has real-world application.

ACKNOWLEDGEMENTS

This work is part of the project "UAH/EV1319-Integra BioFis 5.0: an interdisciplinary meeting space in the Degree in Nursing" and has been funded by the Vicerrectorado de Estrategia y Planificación of the Universidad de Alcalá (UAH), in the 2021-2022 call for Projects for the promotion of Innovation in the Teaching-Learning process.

REFERENCES

- [1] M. Kalogiannakis, S. Papadakis, A.I. Zourmpakis, "Gamification in Science Education. A Systematic Review of the Literature", *Education Sciences*, vol. 11, no. 1, pp. 22, 2021. <https://doi.org/10.3390/educsci11010022>
- [2] D.H. Schunk, J.L. Meece, P.R. Pintrich, *Motivation in education: Theory, research, and applications* (4th ed.). Boston, MA: Pearson, 2014.
- [3] R. Avello-Martínez, M.A. Rodríguez-Monteagudo, "La importancia de la motivación en la enseñanza en línea (Version 1.0)," *Zenodo*, 2020, <http://doi.org/10.5281/zenodo.3743818>

- [4] N.Z. Legaki, N. Xi, J. Hamari, K. Karpouzis, V. Assimakopoulos, "The effect of challenge-based gamification on learning: An experiment in the context of statistics education", *International Journal of Human-Computer Studies*, vol. 144, pp. 102496, 2020. <https://doi.org/10.1016/j.ijhcs.2020.102496>
- [5] D. Gutiérrez-Praena, R. Ríos-Reina, R. Ruiz, E. Talero, R. Callejón, R.M. Callejón, M. Casas, R.R. de la Haba, P. García-Miranda, L. Carrascal, R. Guzmán-Guillén, M. Sánchez-Hidalgo, El uso de una *escape room* como recurso docente en la Facultad de Farmacia. En *IN-RED 2019: V Congreso de Innovación Educativa y Docencia en Red*, pp. 1145-1155, 2019, Editorial Universitat Politècnica de València. <http://ocs.editorial.upv.es/index.php/INRED/INRED2019/paper/view/10356>
- [6] A. Llamas, M. Tejada, D. González, E. Fernández, ¿Es posible hacer divertido y ameno el estudio de la bioquímica?: La gamificación para aprender. *Revista de Innovación y Buenas Prácticas Docentes*, vol. 8, no. 2, pp.1-11, 2019.
- [7] A. Makri, D. Vlachopoulos, R.A. Martina, "Digital Escape Rooms as Innovative Pedagogical Tools in Education: A Systematic Literature Review", *Sustainability*, vol. 13, no.8, pp. 4587, 2021. <https://doi.org/10.3390/su13084587>
- [8] J.L. Gómez-Urquiza, J. Gómez-Salgado, L. Albendín-García, M. Correa-Rodríguez, E. González-Jiménez, G.A. Cañadas-De la Fuente, "The impact on nursing students' opinions and motivation of using a "Nursing Escape Room" as a teaching game: A descriptive study", *Nurse Education Today*, vol. 72, pp. 73-76, 2019. <https://doi.org/10.1016/j.nedt.2018.10.018>